INDUSTRIAL RESEARCH & DEVELOPMENT

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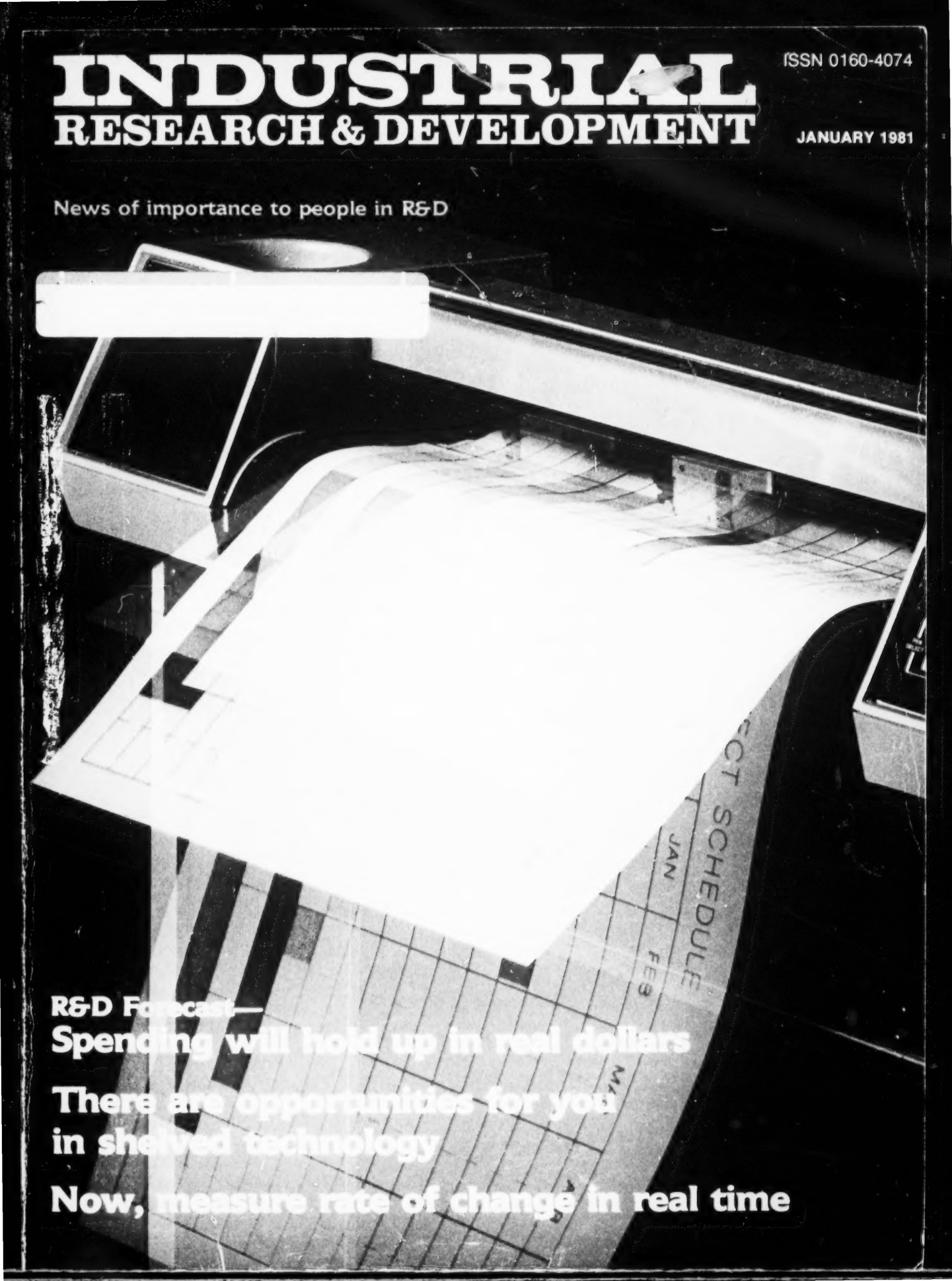
News of importance to people in R&D

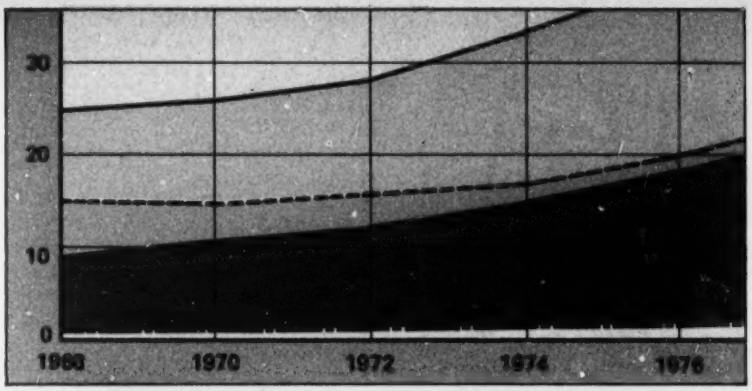


R&D Forecast—
Spending will hold up in real dollars

There are opportunities for you in shelved technology

Now, measure rate of change in real time

Sources of R&D funding — see page 114



INDUSTRIAL RESEARCH & DEVELOPMENT

SERVING THE $142.5-BILLION WORLD-WIDE R&D INDUSTRY

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ABOUT THE COVER

The way people produce designs and layouts is changing rapidly. A part of this change is brought about by a new, large-format plotter from Hewlett-Packard.

The plotter produces engineering and scientific drawings on commercially-available media. It can automatically select up to eight colors, as well as different line widths and fonts. Pens not in use are capped by the instrument.

The plotter accepts precut sheets and preprinted forms of paper, vellum, or polyester film. Repeatability equals that of machines costing twice as much. Resolution is better than that of most comparably-priced units.

Pen acceleration is the fastest available in a plotter of this size. A microgrip mechanism maintains constant positive control of the medium.

For additional versatility, the plotter accepts commands from either a small or a large computer. A related article begins on p. 122.

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ABP BPA

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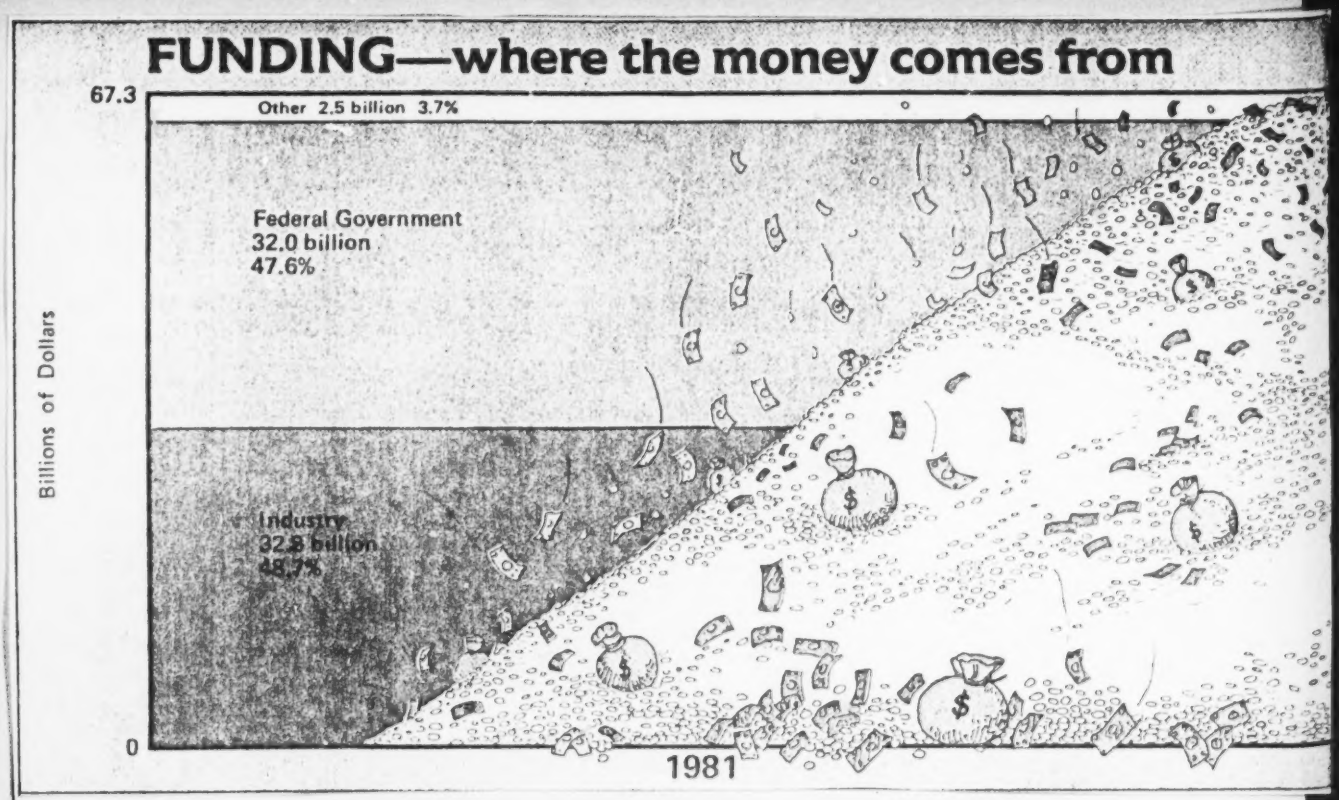


C.J. Mosbacher
Executive Editor, IR&D

More than $67-billion for R&D in '81

Increased funding by industry should offset smaller growth in Federal government funding caused by budget changes both past and potential, leading to an IR&D forecast of $67.3-billion

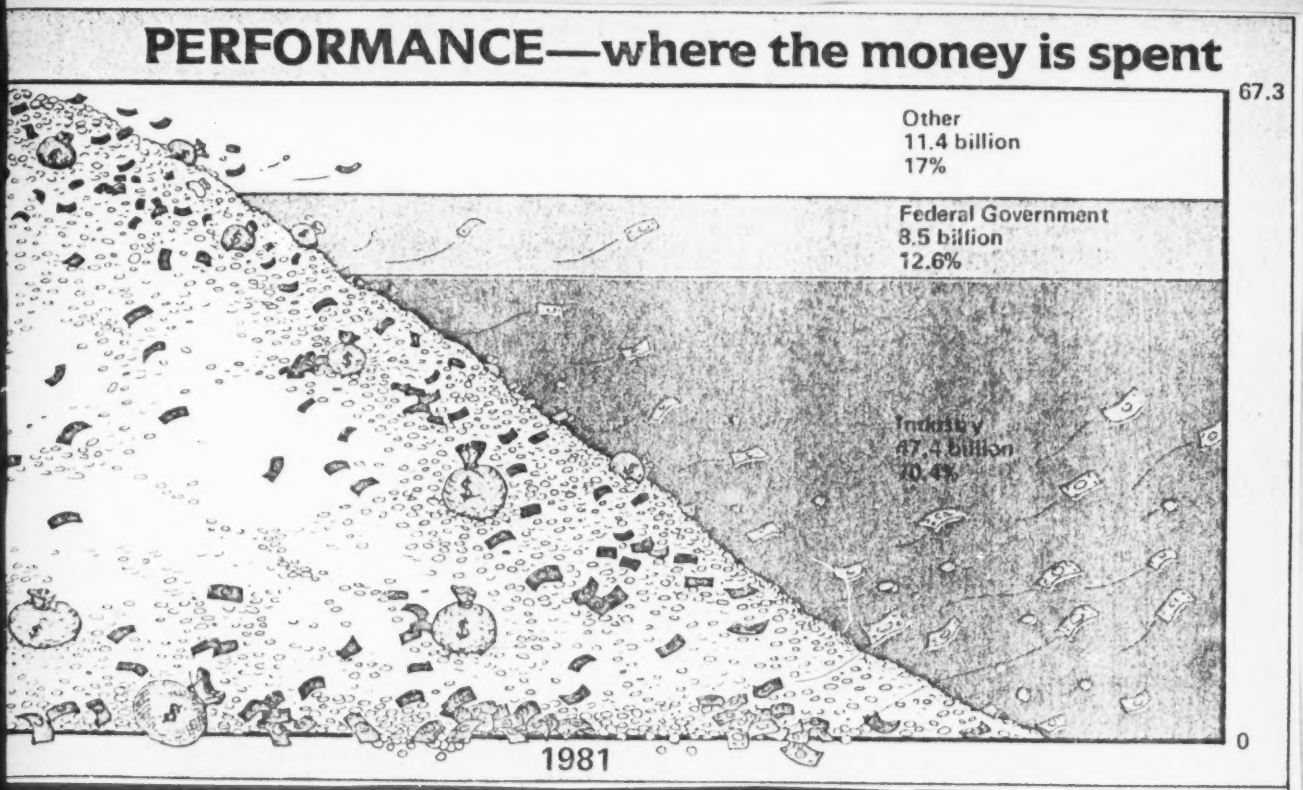
WHILE RECESSION looms over the general economy . . . the R&D sector should continue its steady, slow real growth with funding increases just topping the expected inflation rate. So began the forecast of the 1980 R&D economy on page 103 of this magazine last January. Now, a year later, the same words are true when applied to total funding for R&D.

We expect funds for R&D to total some $67.3-billion in 1981, increasing almost 11.5% from the 1980 level. That's just 1% more than the 10.5% inflation rate that is the consensus of the economic fraternity at the present time for 1981.

But comparing aggregate funding increases with a consumer-price-index inflation rate is at the least misleading when taken as more than a general indication of the health of the R&D economy. More important is a sector-by-sector study of who provides the funds and who does the work. That's the purpose of this forecast.

Each year, we assemble data from the government, trade associations, academic sources, and industry. To enhance these data, we obtain off-the-record information from a number of companies about their R&D budgets for the coming year.

In evaluating these data, the first step we take is to revise our forecast for the



preceding year, essentially adopting the latest revised information from the National Science Foundation as our data base. Our forecast for 1980 was $59-billion, compared to a March, 1979 NSF figure of $57.3-billion. The latest NSF data for 1980 R&D funding (in NSF 80-310, May 23, 1980) give a total of $60.375-billion, including $29.4-billion in Federal government funding. Industry is estimated to provide $28.71-billion, with academic and other nonprofit organizations providing $2.27-billion.

The NSF estimates that the Federal government performed $7.83-billion of R&D in its own laboratories in 1980. Industry performed $42.25-billion, academic and other nonprofits, $10.3-billion.

NSF 80-310 also predicts 1981 funding and expenditures totaling $66.7-billion, with $32-billion from the Federal government $32.21-billion from industry, and sources. Corresponding expenditure levels are $8.5-billion, $47-billion, and $11.2-billion.

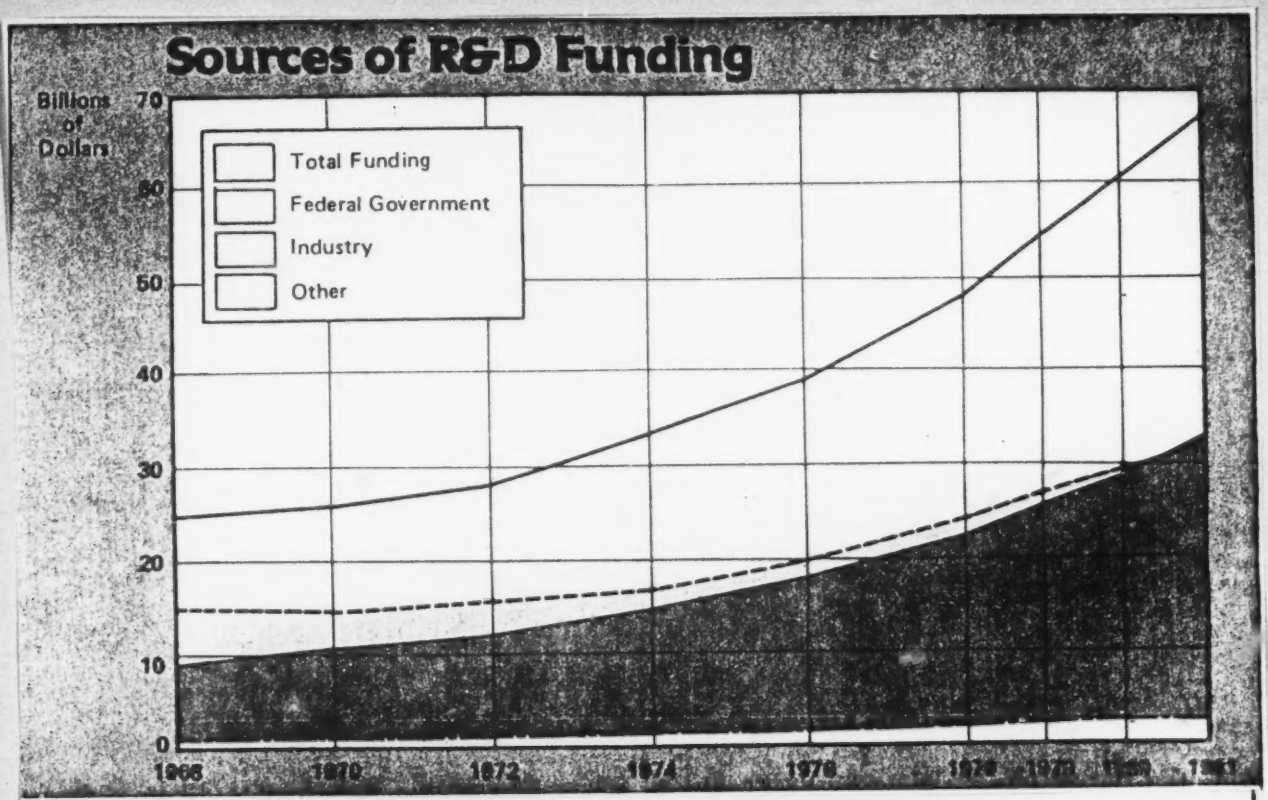
Federal funding lags inflation. While NSF 80-310 took into account a reduction of some $2-billion in President Carter's revised budget for fiscal 1981 to $35.5-billion for R&D, much has happened since. A change in Administrations in Washington, coupled with a Congress that forced the government to operate at fiscal 1980 levels through the first quarter of fiscal 1981 (ending last December 31), clouds any view of Federal funding trends.

Actually, the congressional delay last Fall in passing appropriations should add slightly to calendar 1981 Federal funding. Projects were delayed until funds were made available by Congress, with the exception of the Department of Defense, which received authorization to proceed at the higher funding levels anticipated for the year, 1981.

President-elect Reagan has indicated plans to trim government spending over-all while increasing funding for defense. Certainly R&D has been recognized as a "controllable" expenditure in the past and could well be seen as such once again. We believe, however, that the value of R&D is well recognized by the new President's advisers, and that, while shifts in funds may occur over a period of time perhaps even longer than a year, over-all Federal R&D funding will not change drastically in 1981. Taking into account the lags incurred between the Presidential budget, authorization and appropriation of funds by Congress, obligation of funds by government agencies, and their actual expenditure, we expect Federal funding for 1981 to be in line with the NSF projection of $32-billion. That is an increase of 8.84% from 1980.

We expect the trend of the last few years to continue, with the amount of R&D performed in government laboratories increasing more slowly than other sectors. This leads to Federal government performance of $8.5-billion, an increase over 1980 of only 8.1%. Note, however, that this does not include national laboratories operated by the academic and industrial sectors under contract.

Industry up significantly. Automobile and housing sales may be off, but most of high technology is flying. It's true that R&D in the automotive industry has suf-



fered setbacks, but most of the cutting took place last year. In surveying industry, we were surprised by the commitment to R&D, particularly in high technology, chemical, and energy firms. Planned budget increases for 1981 ranged as high as 25% in firms doing significant amounts of R&D. Few were the firms planning for increases of less than 2% above inflation.

We project that industry funding will total $32.8-billion in 1981, an increase of 14.3% from last year and significantly more than the 12.5% increase from 1979 to 1980.

Performance of R&D in industry won't increase as much. Government-funded projects in industry will grow more slowly than industry's own projects, in line with the smaller growth in Federal funding. We therefore project R&D performance in industry for 1981 as $47.4-billion, an increase of 12.2% over 1980.

Perhaps the most significant point in this forecast is that this is the first year that industry has provided more funds for R&D than the Federal government. (At least that's true from 1953 until now on the basis of the data we have.)

Other sources up 11.7%. Universities, colleges, and nonprofit organizations will provide $2.5-billion for R&D in 1981, increasing their contribution to 3.7% of the total funding from 3.5% in 1980. But their performance climbs only to $11.4-billion, an increase of only 10.7% over 1980. Once again, lagging increases in Federal funds will hold down increased activity. Some easing of the situation is provided by increased industrial funding of academic research, a trend we expect to accelerate in future years.

How much real increase? We've already pointed out the danger of comparing increases in R&D funding to such measures of inflation as the consumer price index. NSF, in providing data in constant 1972 dollars as well as current dollars, uses the "GNP implicit price deflator," a better measure than the consumer price index. But even the GNP deflator does not reflect differences among the sectors in which R&D is performed.

Preliminary studies by Edwin Mansfield of the Wharton school at the Univ. of Pennsylvania suggest that the percentage increase in the real R&D expenditures of major industrial sectors may have been exaggerated by about 50% in government statistics covering the decade from 1969 to 1979. These results were presented at the AAAS Colloquium on R and D Policy on June 19, 1980, in Washington, DC.

At the same meeting, Charles Falk, director of NSF's Div. of Science Resources Studies, commented that one of the division's research projects showed that inflation in the academic sector was actually lower than the GNP deflator in recent years.

Unfortunately, sector inflation rates still are not known precisely. The best we can say is that R&D probably will show some small but real growth in 1981 considering the present economic conditions. If the economy improves as the year progresses, and if the pace of new defense and energy projects funded by the government increases beyond our expectations, 1981 could better our forecast and turn into a banner year for R&D. □